OPERATING INSTRUCTIONS
MODELS 121, 122, 123, AND 124
REGULATED POWER SUPPLIES

FOR SERIAL # _____

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- REGULATED POWER SUPPLIES
- ELECTRONIC INSTRUMENTS

Quan-Tech
LABORATORIES INC.
BOONTON, N. J.

OPERATING INSTRUCTIONS
MODELS 121, 122, 123, AND 124
REGULATED POWER SUPPLIES

FOR SERIAL #_____

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QUAN-TECH LABORATORIES

60 PARSIPPANY BLVD. BOONTON, NEW JERSEY

Telephone DE 4-8500

GENERAL

The 120 series encompasses a group of precision, solid-state low-voltage DC Power supplies. They are characterized by extremely close regulation and low ripple content. Both output current and voltage are metered, and electronic protection against short circuit or overload is provided. Output current level may be pre-adjusted to protect equipment under test. Provision is made for remote error sensing from a terminal strip at the rear of the chassis.

SPECIFICATIONS, 120 SERIES

Model	Output Voltage	Output Current	Dimensions (overall)	Weight	Power Input
~~121~~ 5103	0.1 – ~~15~~ 18 VDC	0 - ~~5~~ 4 amps	19" x 3½" x 15"	23 lbs.	125 Watts
~~122~~	0.1 – 36 VDC	0 - 3 amps	19" x 3½" x 15"	23 lbs.	125 Watts
~~123~~	0.1 – 50 VDC	0 - 2 amps	19" x 3½" x 15"	23 lbs.	125 Watts
~~124~~	0.1 – 50 VDC	0 - 5 amps	19" x 5¼" x 15"	43 lbs.	400 Watts

REGULATION: ±0.01% or ±3 millivolts (whichever is greater) from no load to full load or from 105 V to 125 V line.

RIPPLE: Less than 500 microvolts RMS.

INTERNAL IMPEDANCE: Less than .001 ohm in series with 1 microhenry.

TRANSIENT RESPONSE: NL to FL, recovers to within .003 volt in less than 50 microseconds. FL to NL, recovers to within .05 volt in less than 50 microseconds, recovers to within .003 volt in less than 2 milliseconds.

AMBIENT OPERATING TEMPERATURE: 0 to 40°C.

TYPICAL TEMPERATURE COEFFICIENT: 0.01% per °C.

OVERLOAD PROTECTION: An electronic circuit automatically limits overload and short-circuit current to a safe value. The supplies recover immediately upon removal of the overload or short-circuit. Current levels may be preadjusted to protect equipment under test.

OUTPUT TERMINALS: Binding posts, isolated from the chassis, are located on the front panel. An output terminal strip and provision for remote error sensing are available at rear of the chassis.

POWER INPUT: 105-125 volts, 50-60 cycles.

MOUNTING: Rack mounting in standard 19" rack panel. Units are adaptable for bench use by use of accessory case adapters. See Catalog Sheet for details.

OPERATION

1. For Models 121, 122 and 123: Place the unit so that it has ventilation at the back where the heat radiators are located.

   For Model 124: Place the unit so that it has an unobstructed air path to the filter on the left side of the front panel and to the grill at the left rear of the instrument. Thermal protection is provided in the Model 124 to insure that the internal temperature does not rise above a safe value. In the event that the unit does become overheated, a thermal cutout will disable the main supply until the temperature returns to the "safe" level.

2. Plug the power cord into a source of 105-125 volt, 50-60 cycle , AC power. Turn the power switch to ON and all three knobs fully clockwise. The voltmeter should read slightly over ~~full scale~~. 18 VOLTS.

3. Turn both voltage control knobs fully counter-clockwise and short-circuit the output terminals. Advance the main control knob clockwise. The ammeter should rapidly go off-scale and then gradually drop back to approximately 20% of full scale at full clockwise rotation. Turn the MAXIMUM CURRENT knob fully counter-clockwise and repeat the above. The output current should rise rapidly to approximately 20% of full scale and then fall back. The power supply may now be connected to the load.

4. Under overload conditions electronic circuitry in these power supplies will limit the maximum overload (or short circuit) current to about 30 to 50% above full rated output current with the MAXIMUM CURRENT control in the full clockwise position. If it is required to limit the maximun overload current to some value less than 150% of full rated current, the following procedure should be followed:

   a) Turn the VOLTAGE and VERNIER VOLTAGE knobs fully counter-clockwise, turn the MAXIMUM CURRENT control fully clockwise, and short-circuit the output terminals.

   b) Advance one of the voltage control knobs clockwise (if necessary) until the ammeter reads slightly more than ~~full scale~~. 4 AMPERES

   c) The MAXIMUM CURRENT control may now be set for any value from ~~about 20% to 100% of full scale~~, however, it must always be 50% greater than the desired load current.

4 AMPERES DOWN TO ABOUT 1 AMPERE.

MAINTENANCE AND REPAIR

1. The interior of the power supply may be reached by removing the screws that hold the top on the case.

2. Components on the main printed circuit may be inspected by removing the five mounting screws.

MAINTENANCE AND REPAIR (Cont'd)

3. For Models 121, 122, and 123: The screws holding the rear printed circuit also serve as the connections to the collectors of the pass transistors. The supply should not be operated unless all screws are in place and tight.

4. For Model 124: The air filter may be reached for cleaning by removing the four screws in the corners of the air filter cover. The filter is a washable urethane foam material which should be removed and cleaned for re-use, as often as is necessary for proper ventilation of the power supply. (Time between cleanings varies with use of the power supply and dust content of intake ventilation air.) The filter is cleaned by washing it thoroughly in any type soap or detergent and water, and will not be damaged by boiling water. After a clear water rinse and "squeeze" dry, the filter may be replaced and is ready for use. If it is properly cleaned periodically, the filter should never need replacing.

5. The majority of the components in this instrument are standard commercial parts, available at most suppliers. Special replacement parts can be obtained from Quan-Tech Laboratories.

6. In replacing components on the printed circuit board, the iron should be just hot enought to melt the solder quickly. Avoid prolonged heating and pressure that might push the copper away from the board while hot.

BLOCK DIAGRAM DESCRIPTION:

1. Auto Transformer and Voltage Rheostat: The collector voltage of the pass transistors in the Regulator part of the circuit is held several volts above the DC output voltage by ganging the Voltage Rheostat and a variable auto transformer which supplies AC power to the Main Silicon Rectifier. In this manner the internal power dissipation for full rated output current is held fairly constant over the entire output voltage range.

2. Main Silicon Rectifier: Unregulated, low voltage DC required to supply the output power is obtained through the use of a step-down transformer, a full wave bridge silicon rectifier and a bank of filter capacitors.

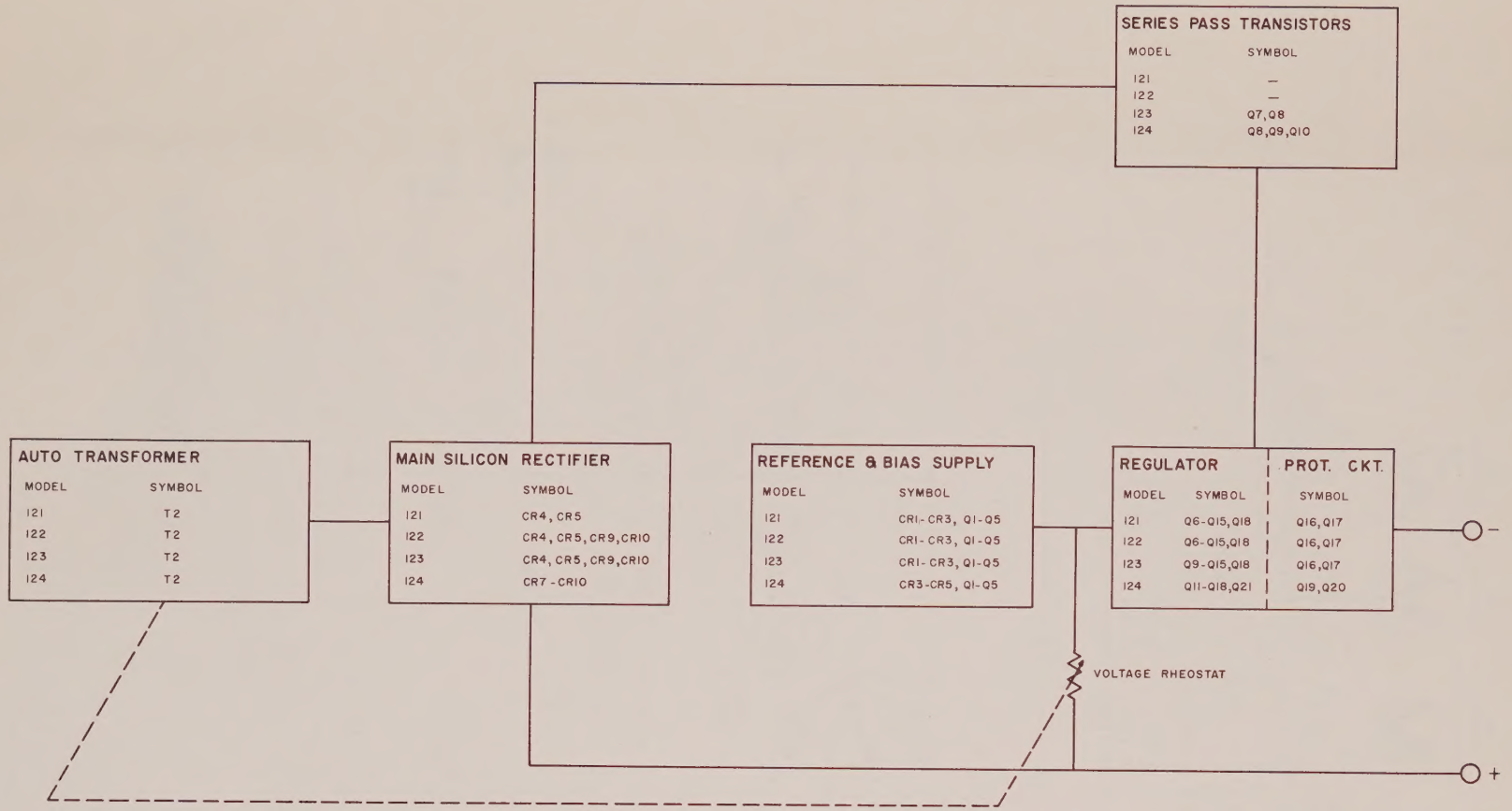
3. Reference and Bias Supply: Voltage reference and Regulator Amplifier operating voltages are obtained from an internal, fixed voltage, highly regulated sub-supply. This supply utilizes a temperature compensated Zener voltage reference diode, low temperature coefficient wire bridge resistors and a balanced differential type detector to minimize long term temperature drift.

4. Regulator: The main regulator is a five stage DC coupled amplifier with the first two stages in balanced differential configurations to minimize temperature drift. Conservative power dissipation is achieved in the final power stage by paralleling power transistors and maintaining a reasonably constant collector voltage over the output voltage range as described in the Auto Transformer and Voltage Rheostat section.

BLOCK DIAGRAM DESCRIPTION: (Cont'd)

5. Protective Circuit: Maximum output current is limited to approximately 130-150% of full rated current by a transistor amplifier which overrides the normal drive to the final stage of the Regulator. This circuit also reduces the output current to approximately 20% of full rated current under severe overload conditions (i.e. short circuit). The Protective Circuit automatically returns the Regulator to normal control when overload conditions have been removed.

6. Series Pass Transistors: In the higher voltage models each power transistor in the final stage of the Regulator has another power transistor connected in series with it's collector. The series transistors split the unregulated supply voltage with their respective counterparts in the Regulator Circuit, thereby reducing the per unit dissipation to one half. This approach is taken primarily as a protective measure and serves a useful purpose only under overload and short circuit conditions.



BLOCK DIAGRAM

MODELS 121,122,123&124

REGULATED POWER SUPPLIES
MODELS 121, 122, 123 and 124

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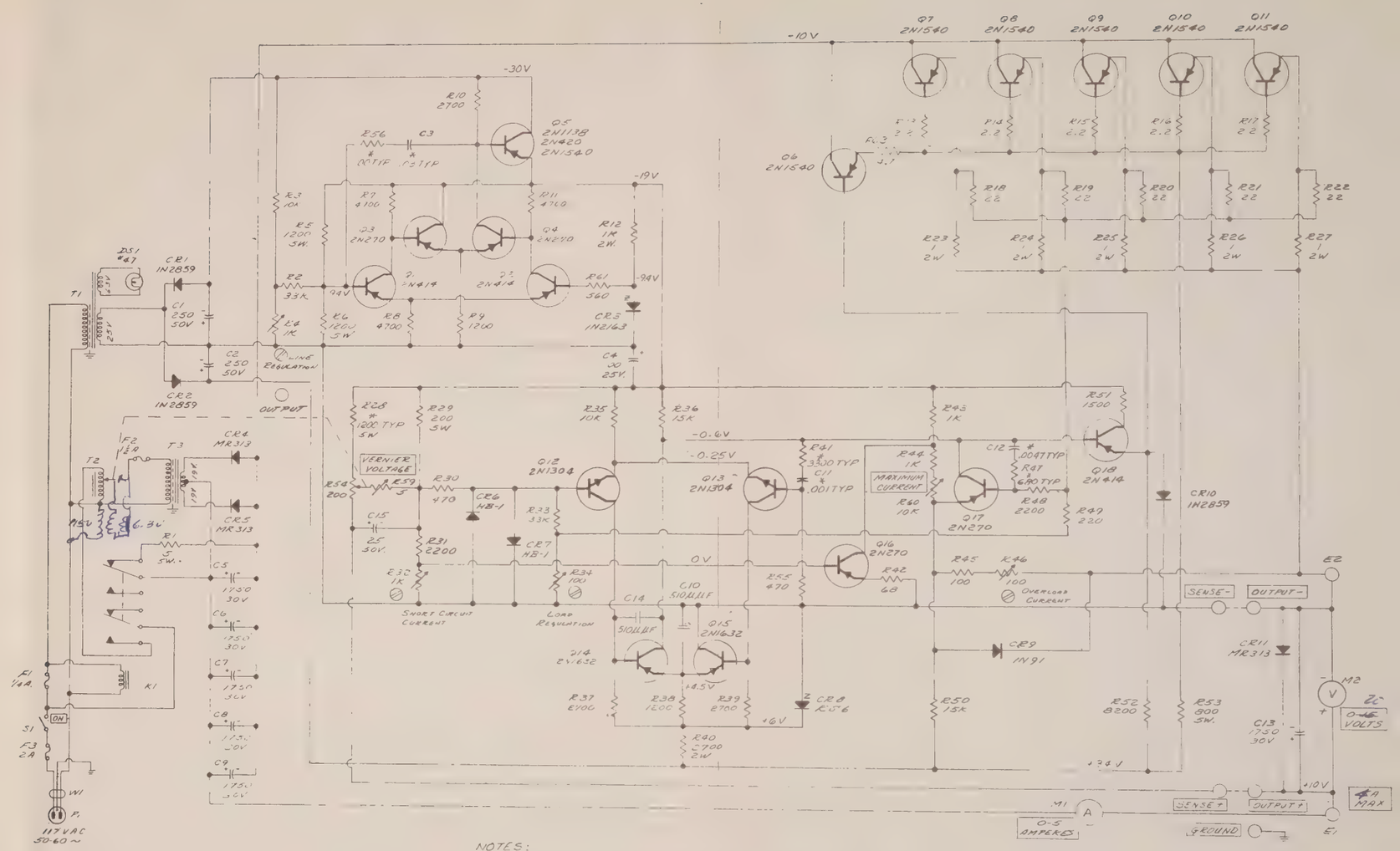


NOTES:
1. TYPICAL VOLTAGES MEASURED FROM NEGATIVE OUTPUT TERMINAL.
2. LINE VOLTAGE 117V, OUTPUT SET TO 10VOLTS, NO LOAD WITH VERNIER VOLTAGE FULL CCW AND MAXIMUM CURRENT FULL CW.

LEGEND

K = 1,000

⊘ = SCREW DRIVER ADJUSTMENT

○ = FRONT PANEL CONTROL.

▭ = FRONT PANEL CONTROL

UNLESS OTHERWISE SPECIFIED:-

ALL RESISTANCES IN OHMS.

ALL RESISTORS ½ WATT

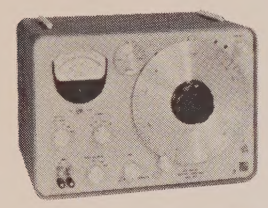
ALL CAPACITANCES IN MICROFARADS.

* = FACTORY SELECT

SCHEMATIC
POWER SUPPLY
MODEL ~~PP~~ S-108

C-1467-K

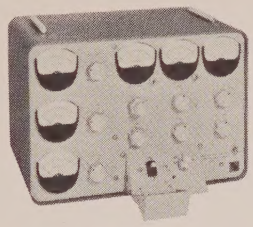
Quan-Tech INSTRUMENTS



MODEL 303
WAVE AND NOISE SPECTRUM ANALYZER

Fully transistorized spectrum analyzer covers frequency range from 30 cps to 100 kc. Front-panel selection of 4 constant bandwidths (10, 30, 100 & 1000 cps) the 100 & 1000 cps bandwidths are flat topped, simplifying noise computations, greatly improving accuracy, and simplifying tuning. Sensitivity: 100 μv to 300 v, full scale; down to 1· μv full scale with Model 203 Amplifier (see below). Additional features: ± 300 cps vernier; selection of long or short meter time constants; metering circuits compensated to minimize error from instantaneous noise pulses; overload protected meter; analog output for external monitoring.

PRICE: $1425



MODEL 310
TRANSISTOR NOISE ANALYZER

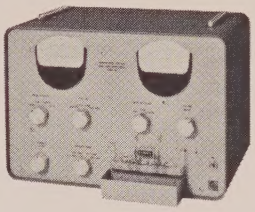
Measures noise at 100 cps, 1 kc and 10 kc simultaneously for 3-point spectrum analysis, allowing identification of 1/f-portion of transistor noise. Measures noise voltage over range from 0.01 to 3 μv/root cycle FS, and noise current from 1 to 300 pa/root cycle, FS. Collector current range, 0.05 to 30 ma; collector voltage range, 0.1 to 30 v. Measuring system automatically corrects for variations in transistor gain; measurement also provided of beta, I_{cbo} and I_{ebo}.

PRICE: $2075

MODEL 311 TRANSISTOR NOISE ANALYZER

Similar to above, except that collector current range extends from 5 to 1000 μamperes, for measurement of noise in low-collector-current devices. Beta measurement is not available in the Model 311.

PRICE: $2275



MODEL 315
RESISTOR NOISE TEST SET

Measures noise in resistors in conformance with specifications recommended by National Bureau of Standards and Method 308 of MIL STD 202 B. Tests resistors from 100 ohms to 22 megohms. Range of measurement: 0.6 μv in a decade to 1000 μv in a decade. Output of noise voltage for external monitoring; analog outputs of meter readings for data logging, etc. External cable included to permit locating test jig up to 10-feet from instrument.

PRICE: $1700

MODEL 2136

Same specifications as Model 315 except measures resistors down to 10 ohms.

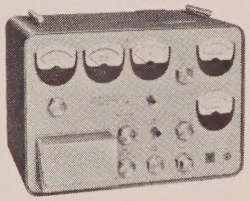
PRICE: $2300

MODEL 317
AMPLITUDE DISTRIBUTION ANALYZER

Establishes the amplitude-probability distribution of random signals to determine whether distribution is Gaussian, or to establish threshold requirements, false-alarm probabilities, etc. Amplifier response: 3db down at approx. 12 cps and 1 mc. Switching rate: 5 mc. Amplitude ranges: 100%, 10% and 1%, FS. "inverted" operation, indicating what percentage of time preset limit is not exceeded, also provided. Output to drive counter at front panel; voltage level may be swept from external source (such as oscilloscope sweep output) for automatic display.

PRICE: $395

MODEL 327
DIODE NOISE ANALYZER



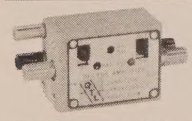
Measures noise in back-biased semi-conductor diodes over range of 0.03 μv to 1 mv per cycle of bandwidth at 10 cps and 1 kc simultaneously. Diode test voltage adjustable up to 500 v; current, to 100 ma. Internally generated ramp sweeps test voltage and/or current automatically within maximum ratings. Sweep selectable in 3 speeds. A wide variety of signal and analog outputs for data logging, external monitoring, actuating external equipment, etc.

PRICE: $2450

MODEL 420 RANDOM NOISE GENERATOR

Provides stable "white" noise output that is gaussian in amplitude distribution from DC to 100 KC. Calibrated output is continuously variable from 0.01 to 1000 μv per root cycle. DC offset is less than 10 mv at max. output. Completely solid-state instrument measures 12" x 6" x 8". **PRICE: $525**

SOLID STATE AMPLIFIERS



MODEL 201-B
DC-COUPLED DECADE AMPLIFIER

Provides controlled gain of 10 from DC to 3 mc (3db). Completely self-contained; battery operated; built-in battery-condition indicator.

PRICE: $95

MODEL 203
LOW NOISE AC AMPLIFIER

Controlled gain of 100 from 30 cps to 100 kc (±0.5 db), down 3 db at 500 kc. Typical noise: 5 x 10^{-9}V and 3 x 10^{-12}A per root cycle at 1 kc. Two Mod. 203's may be plugged together in series for gain of 10,000. Battery operated; fully self-contained; built-in battery condition indicator.

PRICE: $125

MODEL 205
HIGH-STABILITY DC AMPLIFIER

Controlled gain of 10 from dc to 100 kc. Highly stable: typical shorted input drift less than 250 μv at room ambient. Octal basing for plug-in installation. External + and — 12 v. required.

PRICE: $105

All prices shown are F.O.B. Boonton, N. J. Prices and specifications subject to change without notice.

Quan-Tech LABORATORIES, INC.

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